APPENDIX A

IF (it is time to perform housekeeping activities) THEN
  FOR (each TCP connection that has started to close, i.e. observed the TCP FIN flag set) DO
    IF (the time allowed for closure has passed) THEN
      Close this connection

      IF (this is the last connection with this user) THEN
        Reinitialize the user's profile and set the profile state to Incomplete
      ENDIF
    ENDIF
  NEXT

  FOR (each connection that has been idle for the maximum allowed time) DO
    Close this connection

    IF (this is the last connection with this user) THEN
      Reinitialize the user's profile and set the profile state to Incomplete
    ENDIF
  NEXT
ENDIF

IF (it is an IP packet) THEN
  IF (it is an IP/UDP packet) THEN
    Check the source and destination ports against a list of allowed well-known UDP ports

    IF (either port is on the allowed port list) THEN
      IF (the server port is for the XDMCP protocol) THEN
        Check the XDMCP Opcode against a list of allowed opcodes

        IF (the XDMCP Opcode is on the allowed opcode list) THEN
          Check if the XDMCP packet is being sent in an allowed direction

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IF (an allowed Opcode is being sent to the server or an allowed Opcode is being sent to the user) THEN

    IF (there is an established X-Windows connection with this user) THEN

        IF (the Opcode is other than KeepAlive or Alive) THEN

            Discard the packet

        ENDIF

    ELSE

        IF (the Opcode is KeepAlive or Alive) THEN

            Discard the packet

        ENDIF

    ENDIF

    Create and initialize a profile for this user

    Set the profile state to Incomplete

    IF (the Opcode is Query) THEN

        Reinitialize the user's profile and set the profile state to Incomplete

        FOR (each Authentication Name in the packet) DO

            IF (the Authentication Name is not recognized) THEN

                Discard the packet

            ENDIF

        NEXT

        Remember the Authentication Names in the user's profile

    ELSE IF (the Opcode is Willing) THEN

        IF (the Authentication Name in the packet is not recognized) THEN

            Discard the packet

        ENDIF

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IF (the Authentication Name is not one of the authentication names recorded in the user's profile from the Query packet) THEN

    Discard the packet

ENDIF

Remember this Authentication Name in the user's profile

IF (the Hostname supplied by the server is NOT syntactically valid) THEN

    Discard the packet

ENDIF

IF (the Status string is NOT composed of printable characters) THEN

    Discard the packet

ENDIF

ELSE IF (the Opcode is Unwilling) THEN

IF (the Hostname supplied by the server is NOT syntactically valid) THEN

    Discard the packet

ENDIF

IF (the Status string is NOT composed of printable characters) THEN

    Discard the packet

ENDIF

Reinitialize the user's profile and set the profile state to Incomplete

ELSE IF (the Opcode is Request) THEN

IF (the X Display Number is invalid) THEN

    Discard the packet

ENDIF

Remember this Display Number in the user's profile

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```
FOR (each Connection Type in the packet) DO
    IF (the Connection Type is not IP) THEN
        Discard the packet
    ENDIF
NEXT

FOR (each Connection Address in the packet) DO
    IF (the Connection Address is not an IP address) THEN
        Discard the packet
    ENDIF
    IF (the Connection Address does not match the user's IP address) THEN
        Replace the Connection Address with the user's IP address
    ENDIF
NEXT

IF (none of the Connection Addresses matched the user's IP address) THEN
    Discard the packet
ENDIF

IF (the Authentication Name in the packet is not recognized) THEN
    Discard the packet
ENDIF

IF (the Authentication Name does not match the Authentication Name recorded in
the user's profile from the Willing packet) THEN
    Discard the packet
ENDIF

IF (the lengths of the Authentication Name and Authentication Data are not both
zero or non-zero) THEN
    Discard the packet
ENDIF
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FOR (each Authorization Name in the packet) DO
    IF (the Authorization Name is not recognized) THEN
        Discard the packet
    ENDIF
NEXT

Remember the Authorization Names in the user's profile

IF (if the Manufacturer Display ID contains invalid characters) THEN
    Discard the packet
ENDIF

IF (if the Manufacturer Display ID does not match any previous recorded Display
ID for this user) THEN
    Discard the packet
ENDIF

ELSE IF (the opcode is Accept) THEN
    Remember the Session ID in the user's profile

IF (the Authentication Name in the packet is not recognized) THEN
    Discard the packet
ENDIF

IF (the Authentication Name does not match the Authentication Name recorded in
the user's profile from the Request packet) THEN
    Discard the packet
ENDIF

IF (the lengths of the Authentication Name and Authentication Data are not both
zero or non-zero) THEN
    Discard the packet

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    ENDIF

IF (the Authorization Name in the packet is not recognized) THEN
    Discard the packet
ENDIF

IF (the Authorization Name does not match any of the Authorization Names recorded in the user's profile from the Request packet) THEN
    Discard the packet
ENDIF

Remember the Authorization Name in the user's profile

IF (the lengths of the Authorization Name and Authorization Data are not both zero or non-zero) THEN
    Discard the packet
ENDIF

ELSE IF (the opcode is Decline) THEN
IF (the Status string is NOT composed of printable characters) THEN
    Discard the packet
ENDIF

IF (the Authentication Name in the packet is not recognized) THEN
    Discard the packet
ENDIF

IF (the Authentication Name does not match the Authentication Name recorded in the user's profile from the Request packet) THEN
    Discard the packet
ENDIF

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IF (the lengths of the Authentication Name and Authentication Data are not both zero or non-zero) THEN
    Discard the packet
ENDIF

Reinitialize the user's profile and set the profile state to Incomplete

ELSE IF (the opcode is Manage) THEN
IF (the Session ID does not match the Session ID recorded in the user's profile from the Accept packet) THEN
    Discard the packet
ENDIF

IF (the X Display Number is invalid) THEN
    Discard the packet
ENDIF

IF (the Display Number does not match the Display Number recorded in the user's profile from the Request packet) THEN
    Discard the packet
ENDIF

IF (if the Display Class contains invalid characters) THEN
    Discard the packet
ENDIF

IF (if the Display Class does not match any previous recorded Display Class for this user) THEN
    Discard the packet
ENDIF

Set the user's profile state to Complete

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ELSE IF (the opcode is Refuse) THEN
　　IF (the Session ID does not match the Session ID recorded in the user's profile
　　from the Accept packet) THEN
　　　　Discard the packet
　　ENDIF

ELSE IF (the opcode is Failed) THEN
　　IF (the Session ID does not match the Session ID recorded in the user's profile
　　from the Accept packet) THEN
　　　　Discard the packet
　　ENDIF

　　IF (the Status string is NOT composed of printable characters) THEN
　　　　Discard the packet
　　ENDIF

　　Reinitialize the user's profile and set the profile state to Incomplete

ELSE IF (the opcode is KeepAlive) THEN
　　IF (the X Display Number is invalid) THEN
　　　　Discard the packet
　　ENDIF

　　IF (the Display Number does not match the Display Number recorded in the user's
　　profile from the Manage packet) THEN
　　　　Discard the packet
　　ENDIF

　　IF (the Session ID does not match the Session ID recorded in the user's profile
　　from the Manage packet) THEN
　　　　Discard the packet
　　ENDIF

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ELSE IF (the opcode is Alive) THEN
    IF (the Session Running flag is not 0 or 1) THEN
        Discard the packet
    ENDIF

    IF (the Session Running flag is True) THEN
        IF (the Session ID does not match the Session ID recorded in the user's
        profile from the Manage packet) THEN
            Discard the packet
        ENDIF
    ELSE – the Session Running flag is False
        IF (the Session ID is not zero) THEN
            Discard the packet
        ENDIF

        Reinitialize the user's profile and set the profile state to Incomplete
    ENDIF

ELSE – the XDMCP Opcode is not allowed
    Discard the packet
ENDIF
ELSE – the XDMCP Opcode is being sent in the wrong direction
    Discard the packet
ENDIF
ELSE – the XDMCP Opcode is not on the allowed-opcodes list
    Discard the packet
ENDIF
ELSE – the server port is not for the XDMCP protocol
    Discard the packet
ENDIF
ELSE – neither of the IP ports are on the allowed-ports list
    Discard the packet
ENDIF

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```
ELSE IF (it is an IP/TCP packet) THEN
    IF (this packet is for an established TCP connection) THEN
        IF (the TCP RST flag is set) THEN
            Close this connection immediately

            IF (this is the last connection with this user) THEN
                Reinitialize the user's profile and set the profile state to Incomplete

            ENDIF

        ELSE IF (the TCP FIN flag is set for the first time for this connection) THEN
            Remember that the FIN flag was set in the user's profile

            Record that the FIN flag was observed at the current date/time

        ENDIF
    ELSE – the packet is not for an established TCP connection
        IF (the packet TCP SYN flag is set and the TCP ACK flag is not set) THEN
            Check the source and destination ports against a list of allowed well-known TCP ports

            IF (either port is on the allowed port list) THEN
                Check if the TCP connection is being opened in an allowed direction, i.e. the SYN packet is from
                the server to an allowed user port or from the user to an allowed server port

            IF (the TCP connection is being opened in an allowed direction) THEN
                Check if the user port is for the X-Windows protocol

                IF (this is an X-Windows connection) THEN
                    IF (there is not an existing profile for this user) THEN
                        Discard the packet
                    ELSE – there is an existing profile for this user
                        IF (the state of the user's profile is not Complete) THEN
                            Discard the packet

                        ENDIF
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```
                    IF (the user port does not correspond to the X Display Number in the
                    user's profile) THEN
                            Discard the packet
                    ENDIF
            ENDIF
    ENDIF

    Remember this connection in the user's profile
    ELSE – the TCP connection is being opened in a disallowed direction
            Discard the packet
    ENDIF
    ELSE – neither of the IP ports are on the allowed-ports list
            Discard the packet
    ENDIF
    ELSE – this is not a TCP SYN packet
            Discard the packet
    ENDIF
ENDIF

    Remember the current date/time as that of the last packet on this connection
ELSE – it is neither and IP/UDP or IP/TCP packet
        Discard the packet
ENDIF
ELSE – it is a non-IP packet
        Discard the packet
ENDIF
```

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Document 1	PowerDocs://FIRM_DM/10172797/1
Document 2	PowerDocs://FIRM_DM/10172737/1
Rendering set	uspto

Legend:
Insertion
Deletion
Moved from
Moved to
Style change
Format change
Moved deletion

Inserted cell	
Deleted cell	
Moved cell	
Split/Merged cell	
Padding cell	

Statistics:	
	Count
Insertions	16
Deletions	17
Moved from	0
Moved to	0
Style change	0
Format changed	0
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